Space Weather Forecast

Issued on Tuesday, 10 September 2024 at 01:10 Local

From 24 September, the way we distribute this forecast is changing and you will need to take action to continue receiving it. You should have received an email on 04 September explaining the steps required to do this. If you have already signed up to receive the forecast on our premium website, please disregard this message. If you haven't, or if you need help with the process, please contact moswoc@metoffice.gov.uk

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Ongoing Minor solar radiation storm (S1). Minor-Moderate geomagnetic storm G1-G2 likely Tuesday 10 into Wednesday 11 September.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with several low-level Moderate-class x-ray flares observed from a diverse range of sources. The peak of these was an impulsive event at 09/1708UTC from a slowly growing sunspot region on the northeast of the Sun.

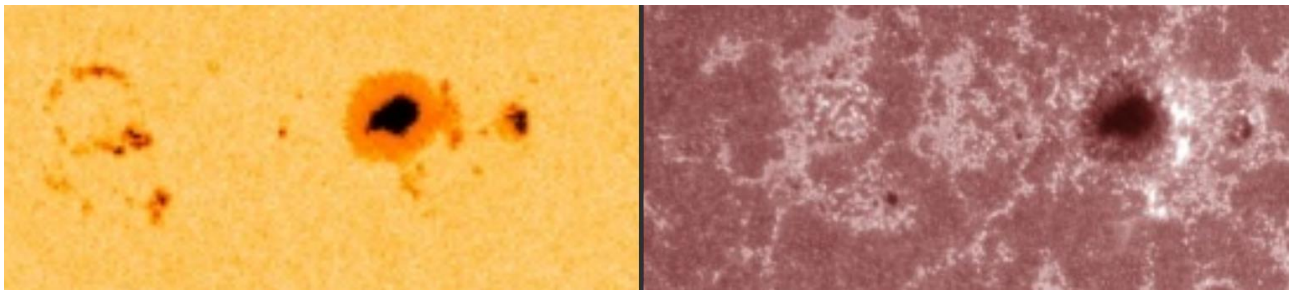

Figure 1: False-colour visible and near infrared satellite imagery of the 09/1708UTC Moderate-class flare– the flare itself emanated from the minor sunspots immediately to the west of the main spot in the group (white flash here in right-hand image). Also shown on the left of both images is the emerging region that showed the most rapid growth of any on the facing side in the period.

There are up to nine sunspot regions on the facing side of the Sun at present, although the partition of the southwest central cluster into different regions is somewhat subjective. The main changes in the period were the development of new leading spots in the most active group in the northeast, and a region immediately neighbouring this group, the latter having undergone significant growth in the 24 hours.

No Earth-directed Coronal Mass Ejections (CMEs) have been observed during the period, although imagery is being monitored for any CMEs arising from the central northeast sunspot region. Satellite imagery showed a westward-heading CME from the long-period Moderate class flare that was the source of the current solar radiation storm; a large eastward-heading CME from the oncoming sunspot cluster; and finally a large far northeast-heading 'prominence eruption' (arc of plasma on the Sun's visible edge). None of these feature in the forecast.

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Solar Wind / Geomagnetic Activity: The solar wind showed an initial slow regime, followed by a possible stepped entry into a minor fast wind of unknown provenance. The solar wind speed started the 24 hours at background levels, rising slightly from 02UTC and further still to slightly elevated highs from 13UTC. The number of particles in the solar wind density was erratic but small-magnitude - within typical background levels throughout. The associated magnetic field rose to slightly elevated levels, while the north-south component varied with an overall co-aligned bias to help limit geomagnetic activity. The net result of the above solar wind measures was for provisionally mainly quiet geomagnetic activity.

Energetic Particles / Solar Radiation: Solar radiation levels (10MeV protons in near-Earth environment) rose to exceed minor solar radiation storm S1 for periods following 09/0845UTC, in the wake of the long-period Moderate-class x-ray flare from an off-going sunspot region on the western solar horizon. Flux levels peaked in the UTC evening at 33pfu, where S1 begins at 10pfu. Higher energy protons showed no notable response.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely to continue throughout, with a daily slight chance of Strong-class flares. The complexity and flare risk of oncoming sunspot regions is likely to exceed that from any departures through midweek UTC, and the overall risk is upwards around this time.

Solar Wind / Geomagnetic Activity: No significant fast winds feature in the forecast, and the main driver of geomagnetism in the period is therefore any glance from the 08 September 'filament' CME. This is most likely due later in the UTC day of Tuesday 10 September into Wednesday 11 September with a Chance of G1-G2 Minor to Moderate geomagnetic storm, else being largely quiet in the absence of any new events.

Energetic Particles / Solar Radiation: A gradual exit from minor solar radiation S1 levels is expected through day one, Tuesday 10 September, eventually settling at a daily slight chance later in the current UTC working week.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	40	10	1
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	60	70	70	70
Very Active	R3 to R5 X	No	10	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	99	30	20	20
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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